Amit Kumar Pathak

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Education

- **Indian Institute of Technology Kharagpur** — West Bengal, India
  Bachelor of Technology in Civil Engineering; ***CGPA: 7.48/10*** — *July 2015 – April 2019*
- **Kendriya Vidyalaya Sangathan** — Patna, India
  SSCE, Percentage: 92.4; SSE, CGPA: 10.0 — *2012 – 2014*

Projects

- **Deep Neural Networks based Velocity prediction using IMU sensors** — Swarm IIT Kharagpur
  Research group, ***Prof. Somesh Kumar*** — *January 2018 - Present*
  - Developing a Deep Neural Network model to accurately predict the Linear & Angular Velocities of a UGV using input from cheap IMU sensor obtaining true value from april tag & stereo-camera setup.

- **Autonomous Hybrid Multi-rotor Aerial Vehicle** — ARK, IIT Kharagpur
  Research Group, ***Prof. Somesh Kumar*** — *October 2017 - Present*
  - Developing a **Hybrid coaxial tri-copter** and **Hybrid tilt-rotor quadcopter** using 3D-printed and CNCed parts to achieve multifolds higher range and flight time as compared to traditional Multi-rotors.
  - Working on modifying PX4 firmware for the hybrid vehicle to achieve multi-rotor as well as fixed wing capability executing smoother tilt transition between the two forms.
  - Finally targeted to achieve **autonomous flight:** takeoff, transition and landing using GPS waypoints.

- **Self Balancing Robot** — IEEE Certified Winter Workshop
  Mentor | *Documentation* — *December 2016*
  - Made a robot capable of balancing itself on two wheels using **two layered PID control**, getting feedback from **sensor fusion** of gyroscope and accelerometer (MPU6050) with encoder motors.
  - Designed & tested the system for checking robustness, convergence and stability of two leveled pid controller.

- **SAR (Search and Rescue) Quadcopter** — HJB Hall
  Hardware Modelling — *October 2017 - Present*
  - Developing a quadcopter system that autonomously navigates and patrols an area using GPS waypoints.
  - Identifies humans from the downward facing camera feed using Deep Learning Techniques and marks it's position with gps coordinate using image transformation and feedback of quadcopter tilt and altitude.

Position of Responsibilities

- **Technology Robotix Society** — IIT Kharagpur
  Head — *March 2017 - Present*
  - Leading a 3-tier team of 35 students as a Head of official robotics society of IIT Kharagpur to conduct national level robotics event in the techno-management fest Kshitij of IIT Kharagpur.
  - Organised multiple workshops the in campus as well as throughout India to spread the culture of robotics.
  - Co-developed the manual event Bomb-disposal organised in Robotix-2017 that saw participation of over 450 students. Event head for the manual event Poles-Apart being organised in Robotix-2018.

- **Aerial Robotics Kharagpur (ARK)** — IIT Kharagpur
  Controls Team Member & Finance Head — *February 2016 - Present*
  - Designed hexacopter platform based on Pixhawk2 FC and Odroid XU4 for high level computations with complete sensor stack to participate in the **International Aerial Robotics Competition-2017** held in Beijing winning the **Most Innovative Design award**.

- Working on development of MAVs for the use in different fields such as Medical Emergency, Agricultural production prediction, Disaster mitigation and autonomous delivery etc.
- As the Finance Head, responsible for procuring and managing the technical inventory of the research group along with handling all the funds and related finances.

- **Swarm IIT Kharagpur** — IIT Kharagpur
  Embedded Electronics Team Head & Finance Head — *February 2016 - Present*
  - Working on developing a decentralised system of robots that can communicate with each other and navigate in a featureless arena localising itself and other robots meanwhile patrolling the arena efficiently.
  - As the Finance Head, responsible for procuring and managing the technical inventory of the research group along with handling all the funds and related finances.

- **Autonomous Winter Workshop** — IIT Kharagpur
  Mentor, IEEE Certified Workshop |*Documentation* — *December 2016*
  - Mentored a group of 40 students in the week long workshop and taught basic embedded electronics, autonomous robotics and basic control systems thereafter achieving targeted Problem Statement.

Relevant Courses

- **IEEE Certified Workshop:**
  - **Autonomous Workshop:** Basic Electronics, Micro-controllers: AVR, Arduino, Embedded Systems, Autonomous Robotics, Controls of mobile robots | **Documentation**
  - **Image Processing Workshop:** C++, Image Processing, OpenCV, Graph Theory | **Project Link**
- Soft Computing Tools in Engineering (Ongoing), Programming and Data Structures, Electrical Technology, Basic Electronics, Transform Calculus, Probablity and Statistics.
- **Coursera:** Deep Learning and Neural Networks, Improving Deep Neural Networks (Ongoing), Machine Learning, Controls of Mobile Robots.
- **Civil:** Computer graphics and engineering drawing, Solid Mechanics, Structural Analysis, Design of Steel Structures.

Technical Skills

- **Languages:** Python, C++, C, MATLAB, Octave, Bash, LaTeX
- **Libraries:** OpenCV, ROS, TensorFlow
- **Softwares:** STAAD Pro, Ansys, SolidWorks, Auto CAD, Atmel Studio, Proteus, Photoshop.
- **Hardware:** AVR, Arduino, Rasberry Pi, Beaglebone Black.

Awards & Achievements

- Won the **Most Innovative Design Award** in IARC-2017 at it's Asia-Pacific venue in Beijing, China.
- Team Captain | Qualified for DRUSE - DRDO Robotics and Unmanned System Exposition Round 2
- **Best Fresher Award** for the Manual Robotics Event: Summit in Kshitij-2016.
- Participated in National Science Exhibition - KVS and won 2nd prize in Regionals.
- Certificate of Excellence - Bihar Science Challenge
- Pratibha Samman - 2012 by Prabhat Khabar

Hobbies & Interests

Robotics - Actively involved in robotics activities around the campus | **Sports and fintess** - Qualified Written, Initial Screening and PABT Test in **NDA-2014**, actively play Volleyball, Table Tennis & Badminton | **Drone Pilot** | **Hiking** | **Debating** | **Writing**